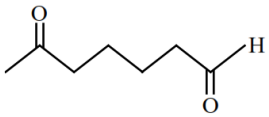
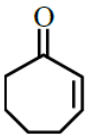
JEE-MAIN EXAM APRIL, 2025

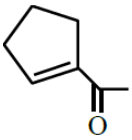
Date: - 08-04-2025 (SHIFT-2)

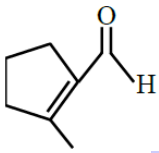
CHEMISTRY

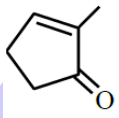
SECTION-A

1. When  undergoes intramolecular aldol condensation, the major product formed is

(1) 

(2) 

(3) 

(4) 

2. Given below are two statements:

Statement I : H_2Se is more acidic than H_2Te

Statement II : H_2 Se has higher bond enthalpy for dissociation than H_2Te

In the light of the above statements, choose the correct answer from the options given below

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

3. In a first order decomposition reaction, the time taken for the decomposition of reactant to one fourth and one eighth of its initial concentration are t_1 and $t_2(s)$, respectively. The ratio t_1 / t_2 will be:

(1) $\frac{4}{3}$ (2) $\frac{3}{4}$ (3) $\frac{2}{3}$ (4) $\frac{3}{2}$

4. On combustion 0.210 g of an organic compound containing C, H and O gave $0.127 g H_2O$ and $0.307 g CO_2$. The percentages of hydrogen and oxygen in the given organic compound respectively are:

(1) 6.72,53.41 (2) 6.72,39.87 (3) 7.55,43.85 (4) 53.41,39.6

5. Match the LIST-I with LIST-II

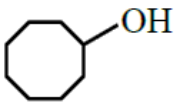
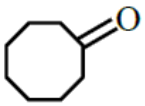
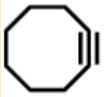
LIST-I		LIST-II	
A.	Carbocation	I.	Species that can supply a pair of electrons.
B.	C-Free radical	II.	Species that can receive a pair of electrons.
C.	Nucleophile	III.	sp^2 hybridized carbon with empty p-orbital.
D.	Electrophile	IV	sp^2/sp^3 hybridized carbon with one unpaired electron.

Choose the correct answer from the options given below:

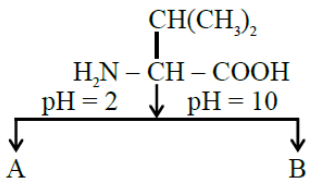
(1) A-IV, B-II, C-III, D-I (2) A-III, B-IV, C-I, D-II (3) A-II, B-III, C-II, D-IV (4) A-III, B-IV, C-II, D-I

6. 1, 2-dibromocyclooctane $\xrightarrow[\text{(ii) } NaNH_2 \\ \text{(iii) } Hg^{2+}/H^+ \\ \text{(iv) } Zn\text{-}Hg/H^+]{\text{(i) KOH (alc.)}}$ P (Major product)

'P' is

(1)  (2)  (3)  (4) 

7.



Choose the correct option for structures of A and B, respectively

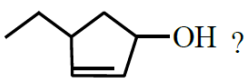
(1) $H_3^+N-CH(CH(CH_3)_2)-COOH$ and $H_2N-CH(CH(CH_3)_2)-COO^-$

(2) $H_2N-CH(CH(CH_3)_2)-COO^{\ominus}$ and $H_3^+N-CH(CH(CH_3)_2)-COO^-$

(3) $H_2N-CH(CH(CH_3)_2)-COO^-$ and $H_3^+N-CH(CH(CH_3)_2)-COOH$

(4) $H_3^+N-CH(CH(CH_3)_2)-COO^-$ and $H_3^+N-CH(CH(CH_3)_2)-COOH$

8. What is the correct IUPAC name of



?

(1) 1-Ethyl-3-hydroxycyclopent-2-ene (2) 4-Ethyl-1-hydroxycyclopent-2-ene

(3) 1-Ethylcyclopent-2-en-3-ol (4) 4-Ethylcyclopent-2-en-1-ol

9. Which of the following binary mixture does not show the behaviour of minimum boiling azeotropes?

(1) $H_2O + CH_3COC_2H_5$ (2) $CS_2 + CH_3COCH_3$

(3) $CH_3OH + CHCl_3$ (4) $C_6H_5OH + C_6H_5NH_2$

10. Given below are two statements:

Statement I : A homoleptic octahedral complex, formed using monodentate ligands, will not show stereoisomerism

Statement II : cis- and trans - platin are heteroleptic complexes of Pd .

In the light of the above statements, choose the correct answer from the options given below

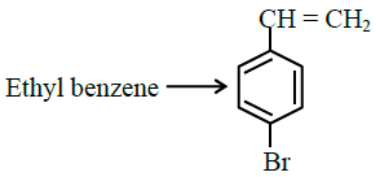
(1) Both Statement I and Statement II are false

(2) Both Statement I and Statement II are true

(3) Statement I is false but Statement II is true

(4) Statement I is true but Statement II is false

11. Choose the correct set of reagents for the following conversion.



(1) $Cl_2 / Fe; Br_2 /$ anhy. $AlCl_3$; aq. KOH (2) $Cl_2 /$ anhy. $AlCl_3; Br_2 / Fe$; alc. KOH

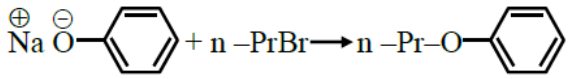
(3) $Br_2 / Fe; Cl_2, \Delta$; alc. KOH (4) $Br_2 /$ anhy. $AlCl_3; Cl_2, \Delta$; aq. KOH

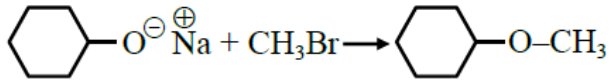
12. Which one of the following reactions will not lead to the desired ether formation in major proportion?

(iso- $Bu \Rightarrow$ isobutyl, sec $-Bu \Rightarrow$ sec-butyl, $nPr \Rightarrow n-$ propyl,

$^t Bu \Rightarrow$ tert-butyl, $Et \Rightarrow$ ethyl

(1) $^t BuO^- Na^+ + EtBr \longrightarrow {}^t Bu - O - Et$

(2) 

(3) 

(4) iso- $Bu O^- Na^+ + sec - BuBr \longrightarrow$ sec $- Bu - O -$ iso $- Bu$

13. The atomic number of the element from the following with lowest 1^{st} ionisation enthalpy is :

(1) 32 (2) 87 (3) 35 (4) 19

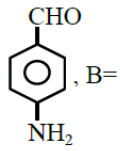
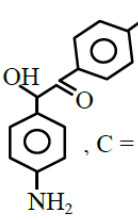
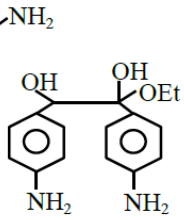
14. $A \xrightarrow[(ii)H_3O^+]{(i)NaOH} B \xrightarrow[(ii)H_2SO_4,\Delta]{(i)EtOH} C$

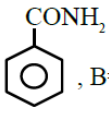
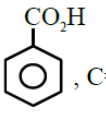
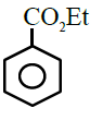
'A' shows positive Lassaign's test for N and its molar mass is 121 .

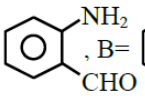
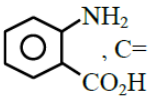
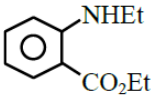
' B ' gives effervescence with aq $NaHCO_3$.

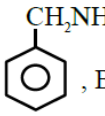
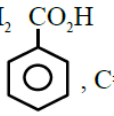
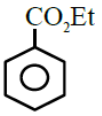
'C' gives fruity smell.

Identify A, B and C from the following.

(1) A=  , B=  , C = 

(2) A=  , B=  , C= 

(3) A=  , B=  , C= 

(4) A=  , B=  , C= 

15. The correct decreasing order of spin only magnetic moment values (BM) of Cu^+, Cu^{2+}, Cr^{2+} and Cr^{3+} ions is :

(1) $Cr^{2+} > Cr^{3+} > Cu^{2+} > Cu^+$

(2) $Cr^{3+} > Cr^{2+} > Cu^+ > Cu^{2+}$

(3) $Cu^+ > Cu^{2+} > Cr^{3+} > Cr^{2+}$

(4) $Cu^{2+} > Cu^+ > Cr^{2+} > Cr^{3+}$

16. Match the LIST-I with LIST-II

LIST-I (Complex/Species)		**LIST-II (Shape & magnetic moment)**	
A.	$[Ni(CO)_4]$	I.	Tetrahedral, 2.8 BM
B.	$[Ni(CN)_4]^{2-}$	II.	Square planar, 0 BM
C.	$[NiCl_4]^{2-}$	III.	Tetrahedral, 0 BM
D.	$[MnBr_4]^{2-}$	IV	Tetrahedral, 5.9 BM

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-III, D-II

(2) A-III, B-IV, C-II, D-I

(3) A-III, B-II, C-I, D-IV

(4) A-I, B-II, C-III, D-IV

17. $HA(aq) \rightleftharpoons H^+(aq) + A^-(aq)$

The freezing point depression of a 0.1 m aqueous solution of a monobasic weak acid HA is 0.20 $^\circ C$. The dissociation constant for the acid is

Given : $K_f(H_2O) = 1.8 K\,kg\,mol^{-1}$, molality $\equiv$ molarity

(1) 1.90×10^{-3} (2) 1.89×10^{-1} (3) 1.38×10^{-3} (4) 1.1×10^{-2}

18. Correct statements for an element with atomic number 9 are

A. There can be 5 electrons for which $m_S = +\frac{1}{2}$ and 4 electrons for which $m_S = -\frac{1}{2}$

B. There is only one electron in p_z orbital.

C. The last electron goes to orbital with $n = 2$ and $l = 1$.

D. The sum of angular nodes of all the atomic orbitals is 1 .

Choose the correct answer from the options given below:

(1) A, C and D Only (2) C and D Only (3) A and B Only (4) A and C Only

19. Match the LIST-I with LIST-II

LIST-I (Reagent)		LIST-II (Functional Group detected)	
A.	Sodium bicarbonate solution	I.	double bond/unsaturation
B.	Neutral ferric chloride	II.	carboxylic acid
C.	ceric ammonium nitrate	III.	phenolic - OH
D.	alkaline $KMnO_4$	IV	alcoholic - OH

Choose the correct answer from the options given below:

(1) A-III, B-II, C-IV, D-I (2) A-II, B-IV, C-III, D-I

(3) A-II, B-III, C-I, D-IV (4) A-II, B-III, C-IV, D-I

20. The number of species from the following that are involved in sp^3d^2 hybridization is

$[Co(NH_3)_6]^{3+}, SF_6, [CrF_6]^{3-}, [CoF_6]^{3-}, [Mn(CN)_6]^{3-}$ and $[MnCl_6]^{3-}$

(1) 4 (2) 6 (3) 5 (4) 3

SECTION-B

21. Consider the following half cell reaction

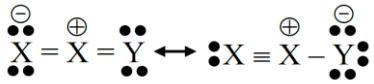
$$Cr_2O_7^{2-}(aq) + 6e^- + 14H^+(aq) \longrightarrow 2Cr^{3+}(aq) + 7H_2O(1)$$

The reaction was conducted with the ratio of $\frac{\left[Cr^{3+}\right]^2}{\left[Cr_2O_7^{2-}\right]} = 10^{-6}$. The pH value at which the EMF of the half cell will become zero is _____ . (nearest integer value)

[Given : Standard half cell reduction potential $E^{\circ}_{Cr_2O_7^{2-},H^+/Cr^{3+}} = 1.33\,V, \frac{2.303RT}{F} = 0.059\,V.$]

22. The energy of an electron in first Bohr orbit of H -atom is -13.6 eV. The magnitude of energy value of electron in the first excited state of Be^{3+} is _____ eV (nearest integer value)

23. Resonance in X_2Y can be represented as



The enthalpy of formation of $X_2Y\left(X \equiv X(g) + \frac{1}{2}Y = Y(g) \rightarrow X_2Y(g)\right)$ is $80\,kJ\,mol^{-1}$. The magnitude of resonance energy of X_2Y is _____ $kJmol^{-1}$ (nearest integer value)

Given : Bond energies of $X \equiv X, X = X, Y = Y$ and $X = Y$ are 940, 410, 500 and $602\,kJ\,mol^{-1}$ respectively.

valence X: $3, Y: 2$

24. The equilibrium constant for decomposition of H_2O (g)

$$H_2O(g) \rightleftharpoons H_2(g) + \frac{1}{2}O_2(g)\ (\Delta G^\circ = 92.34\ kJ\ mol^{-1})$$

is 8.0×10^{-3} at 2300 K and total pressure at equilibrium is 1 bar. Under this condition, the degree of dissociation (α) of water is _____ $\times 10^{-2}$ (nearest integer value).

[Assume α is negligible with respect to 1]

25. 20 mL of sodium iodide solution gave 4.74 g silver iodide when treated with excess of silver nitrate solution. The molarity of the sodium iodide solution is _____ M. (Nearest Integer value)

(Given : $Na = 23, I = 127, Ag = 108, N = 14, O = 16\,g\,mol^{-1}$)

NTA ANSWERS

1.	**(2)**	**2.**	**(1)**	**3.**	**(3)**	**4.**	**(1)**	**5.**	**(2)**	**6.**	**(1)**	**7.**	**(1)**
8.	**(4)**	**9.**	**(4)**	**10.**	**(4)**	**11.**	**(3)**	**12.**	**(4)**	**13.**	**(2)**	**14.**	**(2)**
15.	**(1)**	**16.**	**(3)**	**17.**	**(3)**	**18.**	**(4)**	**19.**	**(4)**	**20.**	**(1)**	**21.**	**(10)**
22.	**(54)**	**23.**	**(98)**	**24.**	**(5)**	**25.**	**(1)**						